

SR 87/SR 260/SR 377 CORRIDOR PROFILE STUDY

JUNCTION SR 202L TO JUNCTION I-40

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DRAFT WORKING PAPER 1: LITERATURE REVIEW

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PREPARED FOR:

ARIZONA DEPARTMENT OF TRANSPORTATION



PREPARED BY:



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LIST OF ACRONYMS AND ABBREVIATIONS

ABBREVIATION	NAME		
ADOT	Arizona Department of Transportation	SATS	Small Area Transportation Study
AGFD	Arizona Game and Fish Department	SHS	State Highway System
AZTDM	Arizona Travel Demand Model	SR	State Route
BqAZ	Building a Quality Arizona	SRPMIC	Salt River Pima-Maricopa Indian Community
CAG	Central Arizona Governments	SWAP	State Wildlife Action Plan
COG	Council of Governments	TI	Traffic Interchange
CPS	Corridor Profile Study	UP	Underpass
DCR	Design Concept Report	USDOT	United States Department of Transportation
DMS	Dynamic Message Sign	40B	I-40 Business Route
FHWA	Federal Highway Administration		
FY	Fiscal Year		
I	Interstate		
L	Loop		
LCCA	Life-Cycle Cost Analysis		
L RTP	Long Range Transportation Plan		
MAG	Maricopa Association of Governments		
MP	Milepost		
MPD	Multimodal Planning Division		
MPO	Metropolitan Planning Organization		
NACOG	Northern Arizona Council of Governments		
N/A	Not Applicable		
OP	Overpass		
PA	Project Assessment		
PARA	Planning Assistance for Rural Areas		
P2P	Planning to Programming		
RTP	Regional Transportation Plan		

1 INTRODUCTION

The Arizona Department of Transportation (ADOT) has identified eleven corridors considered essential in defining the overall health of the statewide transportation system, and is conducting a series of Corridor Profile Studies to plan for their desired performance. These Corridor Profile Studies will link the statewide plan, What Moves You Arizona, and the Planning to Programming Linkage (P2P), which are part of a framework designed to integrate the planning and programming processes in a transparent, defensible, logical, and reproducible way.

The eleven corridors are being evaluated within three separate groupings.

The first three studies (Round 1) began in spring 2014 and encompass:

- I-17: SR 101L to I-40
- I-19: Mexico International Border to I-10
- I-40: California State Line to I-17

The second round (Round 2) of studies, initiated in spring 2015, includes:

- I-8: California State Line to I-10
- I-40: I-17 to the New Mexico State Line
- SR 95: I-8 to I-40

The third round (Round 3) of studies, initiated in fall 2015, includes:

- I-10: California State Line to SR 85 and SR 85: I-10 to I-8
- I-10: SR 202L to the New Mexico State Line
- SR 87/SR 260/SR 377: SR 202L to I-40
- US 60/US 70: SR 79 to US 191 and US 191: US 70 to SR 80
- US 60/US 93: Nevada State Line to SR 303L

The State Route 87 (SR 87)/State Route 260 (SR 260)/State Route 377 (SR 377) corridor between SR 202L (Loop 202) and Interstate 40 (I-40), depicted in **Figure 1**, is one of the strategic statewide corridors identified and is the subject of this Corridor Profile Study. The SR 87/SR 260/SR 377 corridor includes portions of SR 87, SR 260, SR 277, SR 377, SR 77, and I-40 Business Route (40B).

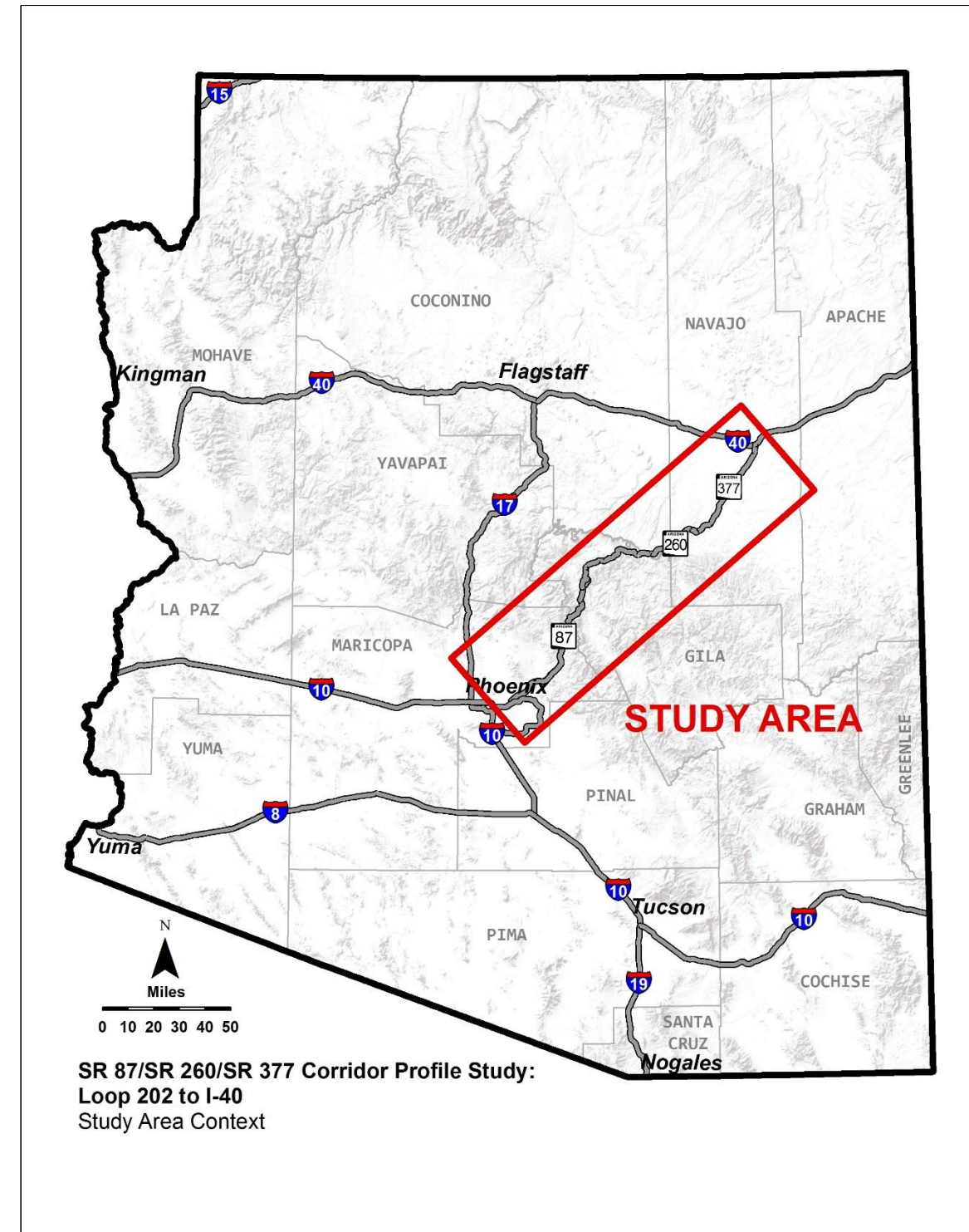


Figure 1: SR 87/SR 260/SR 377 Corridor Study Area

1.1 Corridor Overview

The SR 87/SR 260/SR 377 corridor between Loop 202 and I-40 provides movement for freight, tourism, and recreation needs within Arizona. It provides a key link between the Phoenix metropolitan area and the northeast region of the state and serves intrastate, interstate and international commerce. The corridor connects Mesa, Fountain Hills, Payson, Heber-Overgaard, and Holbrook as well as the Salt River Pima-Maricopa Indian Community (SRPMIC), Fort McDowell-Yavapai, and Tonto Apache tribes. This corridor also serves a number of recreational areas and National Forests.

1.2 Corridor Study Purpose

The purpose of the SR 87/SR 260/SR 377 Corridor Profile Study (CPS) is to define a comprehensive corridor planning and programming approach to help make system-appropriate decisions. This is achieved by measuring corridor performance and using the findings to inform improvement solutions. Life-cycle cost analysis (LCCA) and risk assessment are applied in developing corridor recommendations. This CPS, along with the ten other corridors undergoing similar studies, will define a process to:

- Inventory past improvement recommendations
- Assess existing performance based on quantifiable performance measures
- Define goals and objectives for the future of the corridor
- Propose various solution sets to improve corridor performance in light of the goals and objectives
- Identify projects that provide quantifiable benefit relative to performance
- Prioritize the projects for future implementation

1.3 Study Goals and Objectives

The primary objective of this study is to identify a recommended set of potential projects for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process. The SR 87/SR 260/SR 377 CPS will define solutions and improvements that can be evaluated and ranked to determine which investments offer the greatest benefit to the corridor in terms of enhancing performance. Corridor benefits will be categorized by the following three investment types

- **Preservation:** Activities that protect transportation infrastructure by sustaining asset condition or extending asset service life
- **Modernization:** Highway improvements that upgrade efficiency, functionality, and safety without adding capacity
- **Expansion:** Improvements that add transportation capacity through the addition of new facilities and/or services

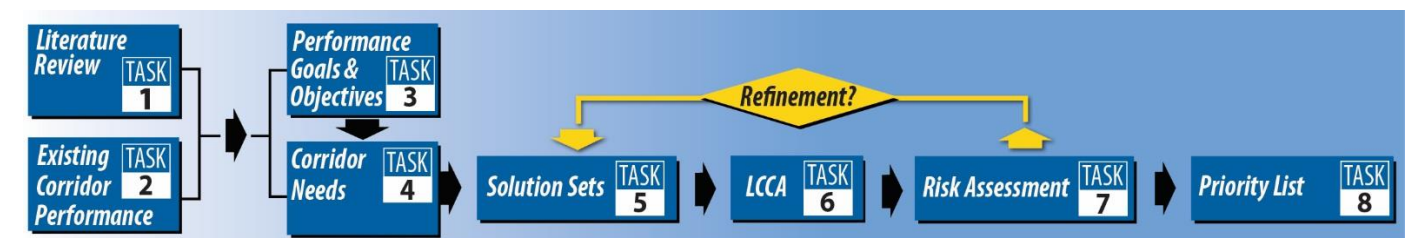
This study will identify potential actions to maintain acceptable levels of performance in the SR 87/SR 260/SR 377 corridor. Proposed actions will be compared based on their ability to achieve desired performance levels, life-cycle costs, and cost-benefits, and the risk associated with reaching desirable measures. These actions will be evaluated to produce a prioritized list of

projects that help achieve corridor goals. The following goals have been identified as the outcome of this study:

- Link project decision-making and investments on key corridors to strategic goals
- Develop solutions that address identified corridor needs based on measured performance
- Prioritize improvements that cost-effectively preserve, modernize, and expand transportation infrastructure

1.4 Study Process

The overall CPS process is shown in **Figure 2**. The process consists of eight tasks where the final results will provide candidate projects for P2P prioritization and inform the upcoming statewide Long Range Transportation Plan (LRTP) Update.



- **Task 1** assesses work already completed in the corridor through a literature review
- **Task 2** determines existing corridor performance based on data collected for the identified performance areas (pavement, bridge, mobility, safety and freight)
- **Task 3** develops long-term goals and objectives that define how the corridor can be expected to function, its primary purpose and performance emphasis areas
- **Task 4** determines corridor needs by comparing existing conditions to expected performance
- **Task 5** formulates solutions to raise performance levels throughout the corridor with a focus on high need areas
- **Task 6** estimates the cost of solutions using life-cycle cost analysis (LCCA) and benefit-cost analysis (BCA) approaches to ensure a full understanding of the long-term costs to be managed
- **Task 7** performs a risk-based assessment to ensure that the solutions selected are the most effective at enhancing corridor performance. Where necessary, solutions can be modified to maximize their performance contribution.
- **Task 8** describes the strategic projects comprising the solutions using a Project Scoping Template

Figure 2: Corridor Profile Study Process

1.5 Working Paper 1 Overview

Working Paper 1 summarizes recent planning, environmental, design and construction efforts on the SR 87/SR 260/SR 377 corridor. These efforts (performed by ADOT and others) include improvements and recommendations to improve corridor performance. Some of the specific improvement projects are programmed for implementation. Task 1 (through Working Paper 1)

provides a basis for understanding the existing condition of the SR 87/SR 260/SR 377 corridor, which will be assessed in detail in Task 2. As appropriate, recommended improvements from previous studies will be incorporated into solution sets during Task 5. The work breakdown of Task 1 includes the following activities:

- **Segmentation of the SR 87/SR 260/SR 377 Corridor:** Segments were determined based on similar operating environments to allow for the appropriate level of analysis
- **Review of Corridor Planning, Environmental, Design, and Construction Efforts:** A literature review was conducted, encompassing work occurring during the past 15 years
- **Stakeholder Discussions:** Information from ADOT Districts, ADOT technical staff, and local metropolitan planning organizations (MPO) and councils of government (COG) helped identify previous work and provide historical knowledge difficult to fully capture in reports

1.6 Study Location and Corridor Segments

The SR 87/SR 260/SR 377 corridor between Loop 202 and I-40 is approximately 175 miles in length. The SR 87/SR 260/SR 377 corridor is located in three ADOT Districts (Central, Northcentral, and Northeast); three planning areas (Maricopa Association of Governments [MAG], Central Arizona Governments [CAG], and Northern Arizona Council of Governments [NACOG]; and four counties [Maricopa, Gila, Coconino, and Navajo]).

The SR 87/SR 260/SR 377 corridor has been divided into 17 segments to allow for an appropriate level of detailed needs analysis, performance evaluation, and comparison between different segments of the corridor. Characteristics considered during the segmentation of the corridor can be summarized into four main categories:

- Roadway grade – associated with elevation, terrain, and weather
- Roadway cross-section – associated with the number and type of travel lanes, whether carriageways are separated or not, and if the roadway is in an urban or rural environment
- Traffic conditions – associated with changes in traffic volume numbers or composition, the presence of major highway junctions, and the influence of adjacent land uses
- Facility type – associated with whether the facility is an interrupted or uninterrupted flow facility

These corridor segments are described in **Table 1** and shown in **Figure 3**.

1.7 Corridor History

A brief overview of the corridor history is provided as follows:

SR 87 (MP 176 to MP 253) is known as the Beeline Highway between Payson and its terminus at Loop 202 in Mesa. Within the study area, SR 87 is primarily a four-lane divided facility, with a five-lane undivided section in the Phoenix and Payson urban areas. SR 87 is part of the National Highway System between Payson and I-10. The road was originally constructed in 1927.

SR 260 (MP 251 to MP 306) generally provides four through lanes (two lanes in each direction) that are separated by either a two-way left-turn lane, a large median, or a double-yellow line.

There are some two-lane segments within this route, primarily between MP 256 and 260 and between MP 282 and MP 304. Within the last ten years, SR 260 has been widened and upgraded between Payson and Heber-Overgaard to a four-lane divided highway with bridges and fencing at wildlife corridors to reduce crashes with deer/elk and other wildlife. SR 260 is part of the National Highway System between Show Low and Payson.

SR 277, (MP 305 to MP 313) is a two-lane undivided facility that is approximately eight miles long. The road was constructed in 1962.

SR 377 (MP 0 to 34) is a two-lane undivided facility that is approximately 34 miles long. This road provides a connection between SR 277 and SR 87. This road was constructed in 1971 and has not undergone any major realignments.

SR 77 (MP 386 to 389) is an approximately three-mile long segment has four-lane undivided and two-lane undivided sections and serves the Holbrook area and links SR 377 to I-40 Business route through Holbrook. SR 77 was originally constructed in 1941. This segment of SR 77 is also known as Apache Avenue.

I-40 Business Route (MP 287-288) is a four-lane facility constructed in 1969 that serves the Holbrook area and links SR 77 to the I-40/ Navajo Boulevard interchange. I-40 Business Route is also known as 40B or Navajo Boulevard. This one-mile segment has a two-way left-turn lane for approximately half of the segment and a double-yellow line for the other half of the segment.



SR 260 near Heber

Table 1: SR 87/SR 260/SR 377 Corridor Segments

Segment	Route	Begin	End	Approximate Begin Milepost	Approximate End Milepost	Approximate Length (miles)	Typical Through Lanes (NB/EB, SB/WB)	Average Annual Daily Traffic Volume (2014)	Character Description
87-1	SR 87	Loop 202	Gilbert Rd	177	182	5	2,2	13,000 – 20,000	This segment has interrupted flow, access points, consistent traffic volumes, a five-lane undivided or four lane divided section, and is located in a fringe urban area.
87-2	SR 87	Gilbert Rd	Fort McDowell Rd	182	191	9	2,2	15,000 – 23,000	This segment has interrupted flow characteristics, access points, consistent traffic volumes, a four-lane divided section, and is located in a fringe urban area.
87-3	SR 87	Fort McDowell Rd	Sycamore Creek	191	213	22	2,2	9,000 – 10,000	This four-lane divided segment has consistent topography and traffic volumes.
87-4	SR 87	Sycamore Creek	SR 188	213	235	22	2,2	11,000	This four-lane divided segment has steep terrain and a curvy alignment.
87-5	SR 87	SR 188	Rye	235	241	6	2,2	9,000	This four-lane divided segment has flatter terrain than surrounding segments.
87-6	SR 87	Rye	Green Valley Pkwy/BIA 101	241	250	9	2,2	11,000	This segment is a climbing four-lane divided section.
87-7	SR 87	Green Valley Pkwy/BIA 101	SR 260	250	253	3	2,2	16,000 – 23,000	This segment is comprised of a five-lane undivided section and is located in the Payson urban area.
260-8	SR 260	SR 87	Mayfield Canyon Rd	252	256	4	2,2	14,000 – 20,000	This segment is comprised of a five-lane undivided section. It is located in the Payson/Star Valley urban area.
260-9	SR 260	Mayfield Canyon Rd	FS 371	256	260	4	1,1	14,000	This segment is comprised of a two-lane undivided section in a rural area.
260-10	SR 260	FS 371	Colcord Rd	260	277	17	2,2	11,000	This segment is comprised of a four-lane divided section. It is a climbing section.
260-11	SR 260	Colcord Rd	Rim Rd	277	282	5	2,2	5,000	This segment is comprised of a four-lane undivided section. It includes a climbing section to the top of Mogollon Rim.
260-12	SR 260	Rim Rd	Black Canyon Ln	282	304	22	1,1	5,000 – 6,000	This segment is comprised of a two-lane undivided section.
260-13	SR 260	Black Canyon Ln	SR 277	304	306	2	2,2	9,000	This segment is comprised of a five-lane undivided section. It is located in the Heber-Overgaard urban area.
277-14	SR 277	SR 260	SR 377	306	313	7	1,1	1,000	This segment is a two-lane undivided section in a rural area.
377-15	SR 377	SR 277	SR 77	0	34	34	1,1	2,000	This segment is a two-lane undivided section in a rural area.
77-16	SR 77	SR 377	I-40 Business	386	389	3	1,1	7,000 – 10,000	This segment has interrupted flow characteristics, access points, a two-lane or four-lane undivided section, and is located in the outskirts of the Holbrook urban area.
40B-17	40B	SR 77	I-40/Navajo Blvd TI	287	288	1	2,2	12,000 – 13,000	This segment has interrupted flow characteristics, access points, a four-lane or five-lane undivided section, and is located in the Holbrook urban area.

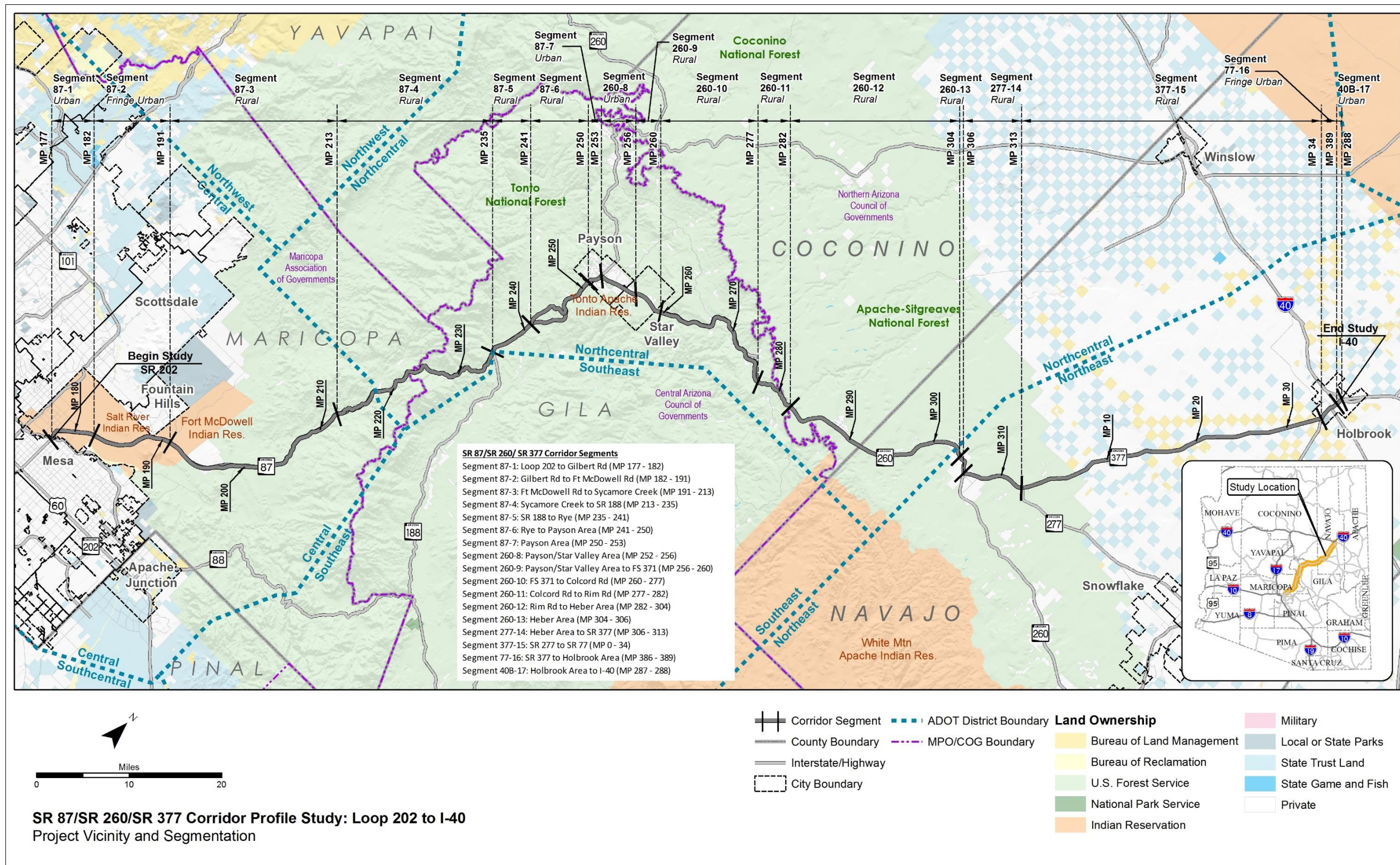


Figure 3: SR 87/SR 260/SR 377 Corridor Study Project Vicinity and Segmentation

2 LITERATURE REVIEW

A literature review was conducted to summarize available prior studies, plans, and programs pertinent to the SR 87/SR 260/SR 377 corridor. The documents reviewed for the literature review are listed in **Table 2**.

The literature review documents were grouped in the following categories:

- Framework Studies
- Regional Planning Studies
- PARAs and SATS
- Design Concept Reports

An overview of key projects recommended for the SR 87/SR 260/SR 377 corridor from previously completed documents that have not been implemented are summarized in tabular form in **Table 3** and shown graphically in **Figure 4**. These recommendations are categorized by the type of investment – preservation, modernization, or expansion.

Table 4 provides a listing of projects that have been constructed along the SR 87/SR 260/SR 377 corridor within the last five years.

Framework and Statewide Studies

- ADOT 5-Year Transportation Facilities Construction Program 2016 - 2020
- ADOT Statewide Bicycle and Pedestrian Plan Update
- ADOT Climbing and Passing Lane Prioritization Study
- Arizona Key Commerce Corridors
- Arizona Multimodal Freight Analysis Study
- Arizona Roadway Departure Safety Implementation Plan
- Arizona State Rail Plan
- Arizona Statewide Dynamic Message Sign (DMS) Master Plan
- Arizona Statewide Rail Framework Study
- Arizona Statewide Travel Demand Model (AZTDM)
- Arizona Wildlife Action Plan / Arizona Wildlife Linkages Assessment
- Building a Quality Arizona (BqAZ)
- What Moves You Arizona? Long-Range Transportation Plan 2010-2035

Regional Planning Studies

- MAG, 2035 Regional Transportation Plan
- CAG, 10-Year Transportation Improvement Plan
- NACOG, 10-Year Transportation Improvement Program

PARAs and SATS

- Gila County Planning Assistance for Rural Areas (PARA) Transportation Study
- Payson Small Area Transportation Study (SATS)
- SRPMIC 2010 LRTP

Design Concept Reports (DCR) and Project Assessments (PA)

- SR 87: New Four Peaks Road to Dos S Ranch – Final Design Concept Report (June 2008)
- SR 87: Mt. Ord to Slate Creek Final Project Assessment (2012)
- Wildlife-Vehicle Collision Mitigation for Safer Wildlife Movement across Highways: SR 260 (2012)
- SR 260: MP282.49 to 305.90, Rim Road to Gibson Road Final Project Assessment (2014)
- SR 260: Payson to Heber, Location/Design Concept Report (May 2000)
- SR 377: HES Evaluation – Accident Analysis, MP 0-MP 33.8 (2005)
- SR 377: SR 277- Holbrook Initial Project Assessment (December 2007)

Table 2: Summary of Relevant Studies and Plans Reviewed

Document	Date Completed	Agency	Summary
Framework and Statewide Studies			
ADOT Five-Year Transportation Facilities Construction Program 2016-2020	2015	ADOT	<p>The purpose of the Five-Year Transportation Facilities Construction Program is to set forth the plan for developing projects for the next five years. Projects that are programmed are:</p> <ul style="list-style-type: none"> SR 87, MP 235, Design and Construct Wastewater System at Mazatzal Rest Area SR 377, Heber to Holbrook Highway, Various locations, Reconstruct curves <p>http://www.azdot.gov/docs/default-source/planning/2016-2020-program.pdf?sfvrsn=8</p>
ADOT Statewide Bicycle and Pedestrian Plan Update	2013	ADOT	<p>The purpose of the 2012 ADOT Bicycle and Pedestrian Plan Update (Plan) is to update the 2003 plan and address the most critical bicycle and pedestrian transportation planning needs on the State Highway System (SHS). Plan recommendations are in three areas: Policies and Plans; Education, Encouragement and Evaluation; and Bicycle and Pedestrian Infrastructure. Key strategies:</p> <ul style="list-style-type: none"> Support local and regional agencies/jurisdictions to establish connectivity and alternative routes to state highways; Collaborate with local and regional jurisdictions to implement infrastructure along and crossing state highways consistent with local bicycle and pedestrian plans; Coordinate with U.S. Forest Service, National Park Service, and Arizona State Parks to ensure that bicycle and pedestrian facilities connect state highways to forests and national parks; Implement the proposed U.S. Bicycle Route System in Arizona. <p>http://www.azbikeped.org/azbikeped/studydocuments.asp</p>
ADOT Climbing and Passing Lane Prioritization Study	2015	ADOT	<p>The 2015 Climbing and Passing Lane Prioritization Study enhances the methodology used in the previous 2003 study and develops a new priority list of locations for passing and climbing lanes utilizing ADOT's current transportation datasets. Recommendations included one project within the SR 87 Corridor:</p> <ul style="list-style-type: none"> SR 260 EB: MP 288-MP 289 was ranked as a high priority (tier level 1) for climbing lanes on two-lane highways. <p>http://www.azdot.gov/docs/default-source/default-document-library/climbingandpassinglane_finalreport.pdf?sfvrsn=0</p>
Arizona Key Commerce Corridors	2014	ADOT	<p>This study involved identifying corridor throughout the state where improvements to infrastructure supports the greatest potential commercial and economic benefits. No infrastructure improvements were recommended for the SR 87 corridor.</p> <p>https://www.azdot.gov/docs/default-source/planning/arizona-key-commerce-corridors-final-report.pdf?sfvrsn=0</p>
Arizona Multimodal Freight Analysis Study	2008	ADOT	<p>Statewide freight study that analyzes the state's freight dependent industries, assesses the multimodal transportation network, and provides strategic recommendations for statewide freight planning.</p> <p>http://azmemory.azlibrary.gov/cdm/ref/collection/statepubs/id/9338</p>
Arizona Roadway Departure Safety Implementation Plan	2015 (ongoing)	ADOT	<p>This is an ongoing study to determine low cost countermeasures to reduce roadway departure crashes on state highways.</p>
Arizona State Rail Plan	2011	ADOT	<p>This study is a comprehensive assessment of the state's rail needs. Identifies the current rail system, determines infrastructure needs, and sets out program to include rail in the state's long-range planning processes to improve regional and statewide safety and mobility.</p>
Arizona Statewide Dynamic Message Sign Master Plan	2011	ADOT	<p>The goal of this document is to provide specific justification warrants, criteria, and consideration of permanent DMS design requirements for the Arizona highway system. An example DMS Analysis was conducted at SR 87 SB at MP 180. The analysis concluded that a DMS was most optimal at SB MP 179.5.</p> <p>https://www.azdot.gov/docs/default-source/business/dms-masterplan.pdf?sfvrsn=2</p>

Document	Date Completed	Agency	Summary
Arizona Statewide Rail Framework Study	2010	ADOT	<p>The Statewide Rail Framework Study has formulated a rail development program and investment strategy for the State of Arizona. Amtrak has service on the BNSF Transcon mainline in northern Arizona, which passes through Holbrook at the northern terminus of the corridor. BNSF's Transcon interchanges with the Apache Railway at Holbrook. Study implementation actions that relate to the SR 87/SR 260/SR 377 corridor are:</p> <ul style="list-style-type: none"> The study recommends facilitating continuing expansion of transcontinental railroad routes and other Class I facilities, while minimizing impacts on adjacent communities. In the Holbrook area, specifically at the Navajo Blvd. crossing, this may include constructing a flyover and quiet zones. A flyover entails raising the railroad over a series of city streets, coupled with closing of other grade crossings. It would improve safety and street traffic flow. <p>http://www.azdot.gov/docs/planning/rail-framework-study-final-report.pdf?sfvrsn=0</p>
Arizona Statewide Travel Demand Model (AZTDM)	Current generation	ADOT	<p>A detailed four-step travel demand model, the primary purpose of which is to assess regional transportation needs in Arizona. AZTDM2 is currently being utilized, with AZTDM3 in development. AZTDM3 will incorporate Population Geo-Synthesis Model, Activity-Based Travel Demand Model, Dynamic Traffic Assignment Model, Integrated Land Use-Transportation Model, and Economic Linkages. Data from the AZTDM will be utilized in the study to for traffic forecasting and travel demand modeling for SR 87 and associated roads.</p>
Arizona State Wildlife Action Plan/Wildlife Linkages Assessment	2012	Arizona Game and Fish Department	<p>The State Wildlife Action Plan (SWAP) provides a 10-year vision for achievement, subject to adaptive management and improvement along the way. The plan covers the entire state, identifying wildlife and habitats in need of conservation, insight regarding the stressors to those resources, and suggests actions that can be taken to alleviate those stressors. Using the Habimap Tool that creates an interactive database of the information included in the SWAP, the following were identified in relation to the SR Corridor:</p> <ul style="list-style-type: none"> Wildlife waters are located on SR 87 at the Bob Martin Spring and at Tonto Basin 4, south of the Payson area and near SR 260 south of Heber at Black Canyon. Another location of wildlife waters is just north of the junction of SR 377 and SR 277, at the Rattlesnake Wash. Arizona wildlife linkages potential linkage zones exist along a section of SR 87, south of the junction of SR 87 with SR 188, and on SR 260 between Payson and Heber. SR 377, SR 77, and 40B have potential linkage zones indicated across much of this area of the corridor. The Species and Habitat Conservation Guide indicates sensitive habitats near SR 377, north of SR 277, and near much of SR 260 and SR 87. Species of Greatest Conservation Need are located near SR 87, and on many areas of SR 260. Areas of more moderate concerns were identified near SR 277, SR 377, SR 77, and 40B. <p>http://www.habimap.org/</p>
Building and Quality Arizona (BqAZ) – 2010 Statewide Transportation Planning Framework	2010	ADOT	<p>Recommendations for a statewide transportation vision were developed from regional framework studies. Future transportation scenarios were assessed based on five principles:</p> <ul style="list-style-type: none"> Improved access and mobility Support economic growth Promote sustainable transportation/land use links Consideration of the environment and natural resources Support safety and security <p>Recommendations affecting the SR 87/SR 260/SR 377 Corridor are:</p> <ul style="list-style-type: none"> Widen/upgrade SR 87 to 6 lanes Widen/upgrade SR 260 to 4 lanes Widen/upgrade SR 277 to 4 lanes Widen/upgrade SR 377 to 4 lanes Widen/upgrade SR 77, Holbrook to Tucson New highway bypass around Payson Improve state highways (shoulders, climbing lanes, etc.) Provide intercity bus service connecting communities of Mesa, Payson, and Heber, within the SR 87 / SR 377 corridor. Intercity bus service also recommended in Holbrook, however, not connecting directly to the SR 87 / SR 377 corridor, but connecting via Show Low to Heber. Provide passenger rail service on an east-west corridor, serving Holbrook Provide a minor transit center in Payson Provide a major transit center in Holbrook <p>http://azmemory.azlibrary.gov/cdm/ref/collection/statepubs/id/8962</p>

Document	Date Completed	Agency	Summary
What Moves You Arizona? Long-Range Transportation Plan 2010-2035	2011	ADOT	A 25-year transportation plan to guide future investments in transportation. The plan used a combination of technical information and public input to develop a fiscally-constrained Long-Range Transportation Plan. No specific projects are listed in the plan. https://www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=2
Regional Planning Studies			
Maricopa Association of Governments 2035 Regional Transportation Plan	2014	MAG	The 2035 Regional Transportation Plan (RTP) is a comprehensive, performance based, multimodal and coordinated regional plan, covering the period through Fiscal Year (FY) 2035. A review indicates that the number of centerline miles on SR 87 within the MAG region is not anticipated to increase. http://www.azmag.gov/Documents/RTP_2014-01-30_Final-2035-Regional-Transportation-Plan-(RTP).pdf
CAG 10-Year Transportation Improvement Program, FY 2015-FY 2024		CAG	A review of the Transportation Improvement Program indicated that no projects were programmed on corridor study roads. http://www.cagaz.org/Departments/tpt/TIP/CAGTIP_FY2015FY2024_RCApproved.pdf
NACOG Regional Transportation Improvement Program, FY 2016-2023		NACOG	A review of the Transportation Improvement Program indicated that no projects were programmed on corridor study roads. http://www.nacog.org/index.cfm?fuseaction=dep_menu&menu_id=5012&dept_id=12
PARAs and SATS Studies			
Gila County PARA Transportation Study	2014	ADOT	The principal purpose of the Gila County Transportation Study was to identify the most critical needs on transportation facilities that are owned or maintained by Gila County and to recommend a program of improvement projects to address these needs. A short term improvement project recommended was the Gila County contribution to the SR 260 Lion Springs road widening project.
Payson Small Area Transportation Study	2011	ADOT	This study was a Long Range Transportation Plan for the Town of Payson. Issues that were identified on SR 87 were: <ul style="list-style-type: none"> SR 260/Manzanita Drive has high crash rate. SR 87 between Bonita Street and SR 260 has high crash rate. At least one leg for several intersections on SR 87 approaches the intersection at a skewed angle resulting in sight distance issues. SR 87 and SR 260 corridors are highly congested in future years due to increased traffic volumes. SR 87/Main Street/Colcord Road intersections fail to meet future traffic volumes. There are no alternate/emergency or circulation routes to the SR 87 North to SR 260 corridor. There are no alternate/emergency or circulation routes to the SR 87 North to West Main Street corridor. Short-term recommendations relating to SR 87 and SR 260 were: <ul style="list-style-type: none"> SR 87/Aero Drive intersection - Conduct a traffic warrant study. Intersection needs to be reconstructed to fix sight distance issues, if traffic signal not warranted. SR 87- Main Street to SR 260 - Incorporate recommendations from Road Safety Assessment and Traffic Operational Analysis Study. SR 87/ Phoenix Street intersection - Conduct Intersection Safety Study and implement recommendations. SR 87/SR 260 intersection - Incorporate recommendations from Road Safety Assessment and Traffic Operational Analysis Study. SR 260/Manzanita Drive intersection - Incorporate recommendations from Road Safety Assessment and Traffic Operational Analysis Study. SR 260 - SR 87 to Manzanita Drive - Incorporate recommendations Road Safety Assessment and Traffic Operational Analysis Study. SR 87/Main Street, Colcord Road/Main Street, Frontier Street/SR 87, and Frontier Street/Colcord Road intersections - Conduct one traffic safety study that covers all four intersections. Mid-term recommendations were: <ul style="list-style-type: none"> SR 87 – North of Aero Drive to north of Frontier Street - Conduct a drainage study. Long-term recommendations were: <ul style="list-style-type: none"> Construct Alternative Route to SR 87 – SR 260 Corridor http://apps.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/Planning_Assistance_for_Rural_Areas_Studies/PARA-Payson_Transportation_Study-FR-1103.pdf
Salt River Pima Maricopa Indian Community 2010 Long Range Transportation Plan	2010	ADOT	The purpose of this study was to develop a short-, mid- and long-term plan of improvements for SRPMIC. This study stated that although the MAG RTP does not show any additional improvements, through FY 2031, ADOT was encouraged to begin planning for widening SR 87.

Document	Date Completed	Agency	Summary
			http://apps.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/Planning_Assistance_for_Rural_Areas_Studies/PARA-Salt_River_Pima_Maricopa_Indian_Community_Long_Range_Transportation_Plan-FR-1009.pdf
Design Concept Reports and Project Assessments			
SR 87: New Four Peaks Road to Dos S Ranch – Final Design Concept Report (June 2008)	2008	ADOT	MP 204.3-206.7 – reconstruct southbound roadway to provide two 12' lanes, 10' outside shoulder, and 4' inside shoulder MP 206.7 to 209.7 – existing roadway will be retained, shoulders will be widened and embankment slopes will be flattened (or guardrail installed). MP 205.4 to 207 – construct a climbing lane southbound
SR 260: Payson to Heber, Location/Design Concept Report (May 2000)	2000	ADOT	This Location/Design Concept Report recommended a four-lane divided roadway on SR 260, between Payson and Heber, except for a five-lane undivided roadway through the Forest Lakes Estates area.
SR 377: SR 277 to Holbrook Initial Project Assessment	2007	ADOT	This Project Assessment provided a scope of work for a shoulder widening project that was in response to crash experience primarily at curved sections of the project area. It also included culvert extensions at two locations, as well as culvert crossing evaluation. The study area was from MP 0 to MP 33.8.
SR 377: HES Evaluation – Accident Analysis, MP 0-MP 33.8	2005	ADOT	A crash analysis was conducted for a three-year period between October 1, 2001 and September 30, 2004. The study found that SR 377 experiences a high volume of single vehicle accidents leading to a high volume of overturns. When the ALISS data was cross-referenced with the ball banking survey data it was found that 45% of the total accidents occurred within horizontal curves. It was recommended that three improvements be considered: <ul style="list-style-type: none"> Increasing shoulder width Implementation of rumble strips Implementation of delineators.
SR 87: MP 224 to MP 226, Final Project Assessment	2012	ADOT	This Project Assessment provided a scope of work for a landslide mitigation project. The purpose of this project is to reduce maintenance costs and provide an acceptable factor of safety for a landslide that became destabilized during the original construction between 1998 and 2001.
SR 260: MP282.49 to 305.90, Rim Road to Gibson Road, Final Project Assessment	2014	ADOT	This Project Assessment provided a scope of work for a shoulder widening project on SR 260 between mileposts 282.49 and 305.9.
Wildlife-Vehicle Collision Mitigation for Safer Wildlife Movement across Highways: SR 260	2012	Arizona Game and Fish Department	Researchers investigated wildlife-highway relationships in central Arizona from 2002 to 2008 along a 17-mile stretch of State Route (SR) 260, which is being reconstructed in five phases and will have 11 wildlife underpasses and 6 bridges. Phased reconstruction allowed researchers to use a before-after-control experimental approach to their research. Researchers used video surveillance to assess and compare wildlife use of six underpasses; 67.5 percent crossed through underpasses. Modeling found that the underpass structure type and placement was the most important factor influencing the probability of successful crossings by elk and Coues white-tailed deer. Elk permeability on reconstructed sections was 39 percent lower than controls, while deer permeability was 433 percent higher on reconstructed sections. The elk-vehicle collision (EVC) rate on fenced reconstructed sections was the same as before-reconstruction levels, but on unfenced sections the elk-vehicle collisions rate was nearly four times higher. In addition to a safer and more environmentally friendly highway, the economic benefit from reduced elk-vehicle collisions on SR 260 averaged \$2 million/year since the completion of three reconstructed highway sections. https://apps.azdot.gov/ADOTLibrary/publications/project_reports/PDF/AZ603.pdf

Table 3: Relevant Recommendations Not Yet Implemented from Previous Studies

Reference No.	Begin MP	End MP	Length (miles)	Recommendations				Implementation		Environmental Documentation (Y/N)	Document
				Project Description	Preservation	Modernization	Expansion	Program Year	Project No.		
SR 87											
1	177	253	76	Widen/upgrade road to 6 lanes			X			N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)
2	180	180	N/A	Construct Dynamic Message Sign		X				N	Arizona Statewide Dynamic Message Sign Master Plan
3	224	226	2	Construct landslide mitigation measures	X					N	SR 87, MP 224 to MP 226, Final Project Assessment (2012)
4	251.6	251.6	N/A	SR 87/Aero Drive intersection - Conduct a traffic warrant study. Intersection needs to be reconstructed to fix sight distance issues, if traffic signal not warranted		X				N	Payson Transportation Study (2011)
5	251.9	253	1.1	SR 87- Main Street to SR 260 - Incorporate recommendations from Road Safety Assessment (RSA) and Traffic Operational Analysis Study (TOAS).		X				N	Payson Transportation Study (2011)
6	251.5	251.5	N/A	SR 87/ Phoenix Street intersection - Conduct intersection safety study and implement recommendations.		X				N	Payson Transportation Study (2011)
7	253	253	N/A	SR 87/SR 260 intersection - Incorporate recommendations from RSA and TOAS.		X				N	Payson Transportation Study (2011)
8	251.9 and 252	251.9 and 252	N/A	SR 87/Main Street, SR 87/ Frontier Street and two other locations - Conduct one traffic safety study that covers all four intersections.		X				N	Payson Transportation Study (2011)
9	252	253	1	SR 87 – North of Aero Drive to north of Frontier Street - Conduct a drainage study.		X				N	Payson Transportation Study (2011)
10	N/A	N/A	N/A	Construct alternative route to SR 87/ SR 260 Corridor in Payson			X			N	BqAZ, 2010 Statewide Planning Framework (2010) Payson Transportation Study (2011)
SR 260											
11	251	306	55	Widen/upgrade road to 4 lanes			X			N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)
12	252.3	252.3	N/A	SR 260/Manzanita Drive intersection - Incorporate recommendations from Road Safety Assessment and Traffic Operational Analysis Study		X				N	Payson Transportation Study (2011)
13	250	252.3	2.3	SR 260 - SR 87 to Manzanita Drive - Incorporate recommendations Road Safety Assessment and Traffic Operational Analysis Study		X				N	Payson Transportation Study (2011)
14	258	260	2.0	SR 260, Lion Springs Section, rural corridor reconstruction to 4-lane divided highway		X		FY 2019 - Preliminary engineering	10516/E 21301/D	N	2015-2019, Five Year Facility Construction Program

Reference No.	Begin MP	End MP	Length (miles)	Recommendations			Implementation		Environmental Documentation (Y/N)	Document	
				Project Description	Preservation	Modernization	Expansion	Program Year			Project No.
15	282.49	305.90	23.41	Construct shoulder widening, Rim Rd to Gibson Rd Segment 2. The project also includes pipe and culvert extensions and relocation of roadside culverts, as well as adding guardrail at two locations. The recommended project limits are between mileposts 282.47-303.8		X		FY 2017 - design	12917/ 01D	N	SR 260, MP282.49 to 305.90, Rim Road to Gibson Road Final Project Assessment (2014) 2015-2019 Five Year Facility Construction Program
16	288	289	1	Construct climbing lane between EB MP 288-289		X				N	ADOT Climbing and Passing Lane Prioritization Study
17	N/A	N/A	N/A	Provide a minor transit center in Payson		X				N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)
SR 277											
18	306	313	7	Widen/upgrade road to 4 lanes			X			N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)
SR 377											
19	0	34	34	Widen/upgrade road to 4 lanes			X			N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)
20	0	33.8	34	SR 377- various locations, reconstruct curves		X		FY 2018	6710 / Hxxxx01C	N	ADOT 5 Year Program 2016-2020 SR 377 HES Evaluation, MP 0-MP 33.8 SR 377:SR 277- Holbrook, Initial Project Assessment
SR 77											
21	386	389	3	Widen SR 77, Holbrook to Tucson			X			N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)
I-40 Business											
22	N/A	N/A	N/A	Provide a major transit center in Holbrook		X				N	BqAZ 2010 Statewide Transportation Planning Framework Final Report (2010)

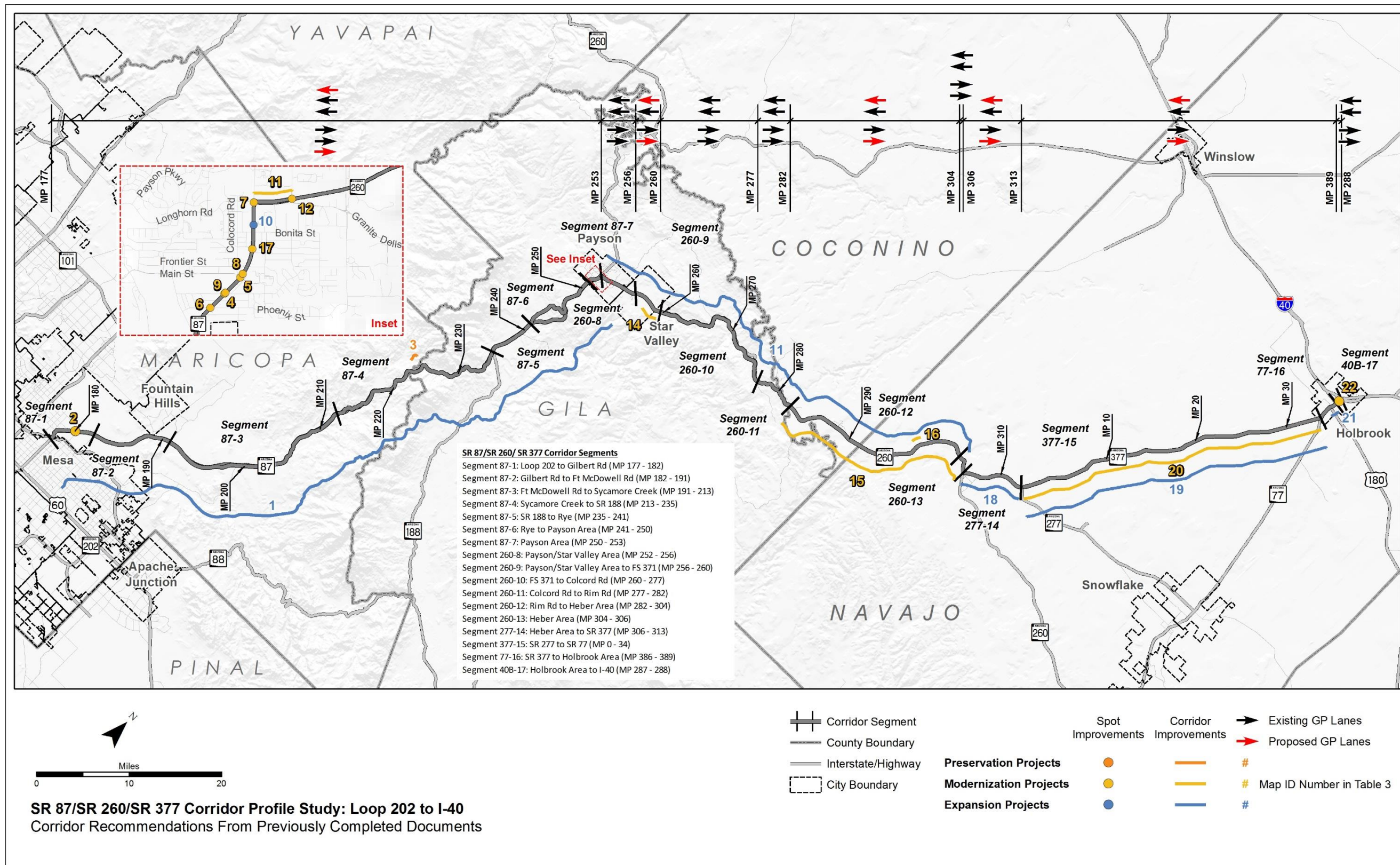


Figure 4: SR 87/SR 260/SR 377 Corridor Recommendations From Previous Studies

Table 4: Projects Constructed on SR 87/SR 260/SR 377 Corridor Since 2010

Project Number	TRACS Number	Begin MP	End MP	As-Built Date	Description	Construction Cost	Type of Project
SR 87							
087-B-(216)A	H8111 01C	177.06	182.10	01/14/2013	SR 87, Jct 202L-Gilbert Road, mill and replace		Preservation
NH-087-B(220)T	HX244 01C	177.81	177.81	N/A	SR 87 and McDowell Road, traffic signal and sidewalk ramps		Modernization
NH-087-B(202)A	H7440 01C	182.19	188.78	1/13/2010	SR 87, Gilbert Road to Shea Boulevard, mill and replace		Preservation
HES-HN-087-B(009)B	H5211 01C	194.10	203.82	8/24/2010	SR 87, Forest Boundary to New Four Peaks, reconstruction and widening		Expansion
ARRA-087-B(205)A	H6782 01C	204.30	209.85	08/25/2011	SR 87, New Four Peaks Road to Dos S Ranch, slope rounding and shoulder improvements		Modernization
ARRA-087-B(206)A	H6758 01C	211.80	213.03	8/11/2011	SR 87, Vicinity of Sycamore Creek, erosion control		Preservation
NH-087-B(213)A	H8272 01C	218.10	224.90	12/05/2012	SR 87, Sunflower(MP218.1) to MP 224.9 near Maricopa/Gila County line, pavement rehabilitation		Preservation
ER-NH-087-B(201)A	H7700 01C	223.92	224.96	06/28/2012	SR 87, Mt. Ord to Slade Creek, slope stabilization		Preservation
N/A	N/A	224.04	224.92	1/2010	SR 87, embankment and slope repair		Preservation
N/A	H8175 01C	224.21	224.48	10/21/2010	SR 87, Mt. Ord to Slate Creek, slope unloading		Preservation
NH-087-B(219)T	H6770 01C	228.41	228.51	9/18/2013	SR 87, Slate Creek, construct access road and low water crossing		Modernization
HSIP-087-B(204)A	H7893 01C	230.63	230.91	10//04/2010	SR 87 (SB), MP 230.63-230.91, install fog coat, guardrail		Preservation
HSIP-NH-087-B(217)T	H8123 01C	235.57	241.04	N/A	SR 87, Junction 188 to Rye, mill and replace	\$3,200,000	Preservation
HES 087-B(004)A	H6598 01C	241.21	243.51	03/10/2010	SR 87, Oxbow Hill (SB), shoulder widening		Modernization
NH-087-B(214)A	HX170 01C	250.91	250.93	08/23/2012	SR 87 and Green Valley Parkway/BIA 101, intersection improvement		Modernization
087-B-(218)T	H8409 01C	251.94	252.47	10/28/2014	Junction of SR 87/SR 260, intersection improvements	\$250,000	Modernization
SR 260							
NH-260-B(201)B	H4699 01C	262.90	267.40	08/10/2012	SR 260, Little Green Valley Section Reconstruct 4-lane roadway		Modernization
NH-260-B(219)T	H8637 01C	267.20	277.00	N/A	SR 260, Tonto Creek Bridge to Wildlife Underpass 2, repair approach slab		Preservation
STP-260-B(207)T	H7894 01C	267.73	277.21	12/06/2012	SR 260, Wildlife Crossing Bridge - Colcord Road		Preservation
NH-TE- 260 B(208)T	H8202 01C	268.50	277.10	N/A	SR 260, Tonto Creek to Colcord, Elk Fencing		Modernization
AC-NH-053-2(043)	H4698 01C	269.00	272.30	10/25/2013	SR 260, Doubtful Canyon Section Construct new 4-lane roadway. Project includes new wildlife underpass bridges		Preservation
-	H8021 01P	282.50	302.70	08/10/2011	Pavement preservation		Preservation
ARRA-999-A(244)A	H7785 01C	282.60	286.10	11/17/2010	Part of statewide culvert lining project		Modernization
STP-999-A(309)T	H8172 01C	302.40	302.40	11/21/2013	Part of a statewide DMS project		Modernization
SR 277 – no projects listed as being constructed from 2010-2015							
SR 377 – no projects listed as being constructed from 2010-2015							
SR 77							
077-B-NFA	H7424 01C	387.48	388.55	02/23/2010	SR 77, MP 387.5-Hopi Blvd, Mill and replace		Preservation
STP-999-A(387)T	H8589 01C	387.50	387.50	N/A	Part of DMS Phase 9A project statewide		Modernization
I-40 Business – no projects listed as being constructed from 2010-2015							

3 CONCLUSION

Communication with ADOT Central District, Northcentral District, and Northeast District staff and other agencies resulted in input on past investments, current needs, and anticipated future challenges for the SR 87/SR 260/SR 377 Corridor. Summaries of the discussions are provided below, with information grouped by the general topics discussed.

3.1 Agency Kickoff Meeting

An agency kickoff meeting for the Round 3 Corridor Profile Studies was held on November 17, 2015. The meeting provided an overview of the corridor profile studies, the purpose of the corridor profile studies, and study expectations, which were:

- Develop performance-based solutions that can be evaluated through the statewide P2P programming process
- Address needs in strategic locations that provide the most value for the investment
- Develop tools that ADOT can use to track corridor performance and levels of need over time
- Provide initial statewide comparison of need across all 11 strategic corridors

The specific corridors were described and the overall corridor profile study process was detailed.

3.2 District Discussion

A teleconference was held Thursday, December 10, 2015 with the relevant ADOT Districts to discuss the corridor profile study process and gather information about the corridor. Attendees were Heidi Yaqub (ADOT), Nathan Reisner (ADOT Northcentral District Development Engineer), Brent Robb (ADOT Payson Construction office), Jack Tagler (ADOT Payson Construction office), Michael Grandy (Kimley-Horn), and Mary Rodin (Kimley-Horn)

The following summary provides an overview of comments and issues that were raised.

- SR 260, near Lion Springs, was programmed to be widened to four lanes, however the project has been deferred. A recommendation of this corridor profile study could be to advance the funding. It is the only two-lane section in the area and it is a bottleneck and safety issue. It was originally programmed for construction in FY 2016 (per the 2013 -2017 Five Year Construction Program), subsequently was programmed for design in FY 2019 (per the 2015-2019 Five-Year Construction Program) but is not programmed for either design or construction in the current 2016-2020 Five Year Construction Program.
- The SR 260 road subgrade is having issues due to underground springs in the Woods Canyon to Forest Lakes area. ADOT is doing pavement preservation in that location, but it is a “band-aid” solution.
- A major shoulder widening project is planned on SR 260, from milepost 282 to 302. The project kicked off two years ago.
- There are traffic backups on holiday weekends on both SR 87 and SR 260 in the Payson area, between mileposts 235 and 250.
- In five to ten years, traffic operations on SR 87 and SR 260 in the Payson area will likely be very similar to how the Milton Road corridor is operating today in Flagstaff.

- An alternative loop route to SR 87 and SR 260 in Payson is opposed by businesses in Payson.
- On SR 87, one-quarter to one-half mile on either side of milepost 226 is showing signs of sliding activity. ADOT recently sealed cracks at that location, but it is something ADOT will need to monitor. The most obvious cracking is in the southbound direction, but there are cracks on the roadside between mileposts 224 and 226.
- A project was started to put micro piles in an embankment area on a curve, at approximately milepost 226, but there was a landslide. Jim Lemon at ADOT is gathering information for a new geotechnical report in this area.

General comments

- The corridor profile study team should take into account the rural nature of the corridor because comparing the performance results to interstate performance is not an equal comparison.
- Data that looks at travel patterns based on cell phone data should take into account the potential unreliability of cell phone coverage in rural areas.
- The corridor profile study team should consider inviting a representative from the United States Forest Service to comment on the study. They have a liaison to ADOT. The Apache-Sitgreaves National Forest has a representative to contact.

3.3 Next Steps

The next steps in the CPS process will be to collect and analyze relevant data, identify current needs, and develop goals and performance objectives for the corridor. The previously recommended projects documented in this working paper will be used as a baseline for project recommendations, although current data will be used to verify need and priority. These recommendations will help to understand the corridor, ultimately building the foundation for identifying strategic corridor investments in the categories of preservation, modernization and expansion in the performance areas of Pavement, Bridge, Mobility, Safety and Freight. The identified strategic investments will be considered with other candidate projects in the ADOT programming process.